

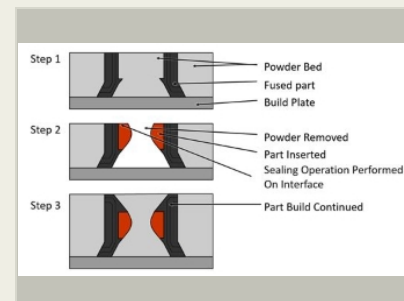
Additively Manufactured Multi-Material Insert, Phase I

Completed Technology Project (2017 - 2017)



Project Introduction

Parabilis Space Technologies is pleased to propose development of a novel additive manufacturing method which enables the use of multiple dissimilar materials in an additively manufactured parent part. This revolutionary process dramatically extends the economic and design advantages of additive manufacturing into areas where either tolerances or available homogeneous materials would otherwise be insufficient. The use of additive manufacturing has the ability to both reduce part count by enabling innovative designs and reduce design cycle time because of the direct connection between the computer generated geometry and the final part. In addition to expanding the range of possibility for part geometries, additive manufacturing is also unique in the property that the cost of manufacturing increases with the addition, not the removal, of material. Conventional machining is driven by the cost of the time required to remove material. This discrepancy often makes lightweight, minimalistic additive manufacturing designs cheaper than traditionally machined parts. This conveys a significant advantage for aerospace parts where mass is at a premium. Unfortunately, these revolutionary manufacturing processes are still limited to homogenous powders. This limits their application to parts made from single materials, which, in turn, limits the components on which they can be used or else requires multi-piece assemblies. Aerospace components often have very different temperature, stress, or material compatibility constraints on different regions of the same part or assembly. The proposed innovation offers a solution to these problems through an innovated method for joining parts into an additively manufactured parent part, creating a functional seal between the materials. This innovation will significantly advance the state of the art of additive manufacturing technology, not only for thrusters and in-space components, but for aerospace and general mechanical parts as well.



Additively Manufactured Multi-Material Insert, Phase I Briefing Chart Image

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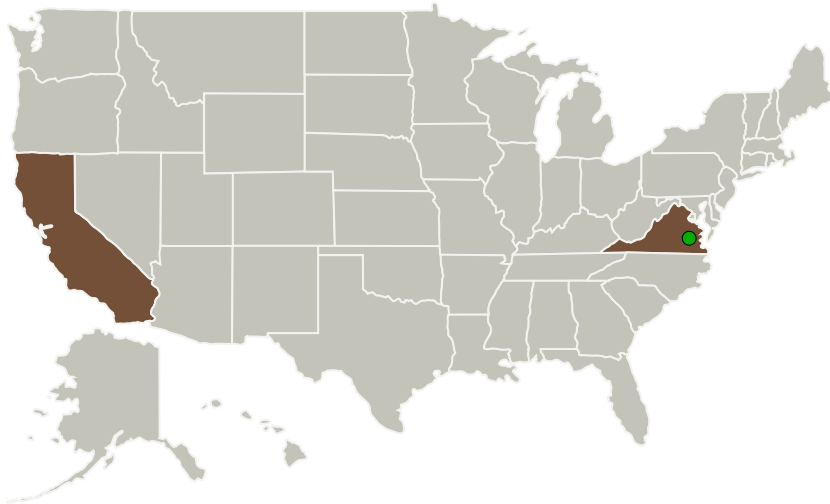
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Parabilis Space Technologies, Inc.	Lead Organization	Industry Historically Underutilized Business Zones (HUBZones)	SAN MARCOS, California
● Langley Research Center(LARC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

California	Virginia
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Project Transitions

**June 2017:** Project Start

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Parabilis Space Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

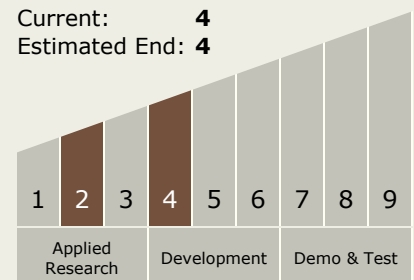
Christopher S Grainger

Technology Maturity (TRL)

Start: 2

Current: 4

Estimated End: 4



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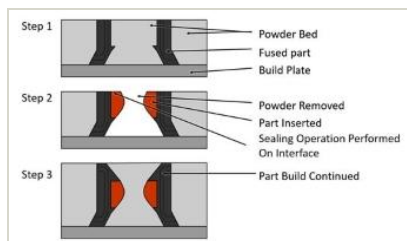


December 2017: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140816>)

Images



Briefing Chart Image

Additively Manufactured Multi-Material Insert, Phase I Briefing Chart Image

(<https://techport.nasa.gov/image/127823>)

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - TX12.4 Manufacturing
 - TX12.4.1 Manufacturing Processes

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System